International Journal of Linguistics and Literature (IJLL)
ISSN (P): 2319–3956; ISSN (E): 2319–3964
Vol. 10, Issue 2, Jul–Dec 2021; 109–118
© IASET

International Academy of Science, Engineering and Technology
Connecting Researchers; Nurturing Innovations

HEALTH AWARENESS AND THE EFFECTS OF PESTICIDES IN MARKET GARDENING IN KORHOGO (CÔTE D'IVOIRE)

Sangare Moussa

Research Scholar, Peleforo Gon Coulibaly University, Côte d'Ivoire

ABSTRACT

Chemical pesticides are increasingly used in vegetable crops for human consumption. This study examines the effects of these pesticides on the health of consumers in the Korhogo area. It was carried out through a survey conducted with more than a third (1/3) women market gardeners from the CHIGATA group. Descriptive analysis of the data revealed that 40% of female producers are between 30 and 34 years old, only 20% are between 40 and 44 years old. The majority of women (90%) are married and 90% of them are also illiterate. Thus, the status of married women explains the fact that they obtain their supplies of chemical pesticides from their cotton-producing husbands. Also, the illiteracy of women is the basis of their ignorance of the risks of consuming vegetables treated with these pesticides intended for cotton. In fact, the massive use of chemical pesticides not recommended for market gardening can have consequences on the health of consumers.

KEYWORDS: Chemical Pesticides, Woman, Market Gardening, Health.

Article History

***Received:* 07 Dec 2021 | *Revised:* 13 Dec 2021 | *Accepted:* 15 Dec 2021**

INTRODUCTION

Agricultural production is increasingly characterized by the use of mineral fertilizers for soil fertilization and pesticides for weed control and phytosanitary treatment of cultivated plants (Adechian *et al.* 2015). Like other crops, market gardening production is growing to meet the demand of large urban centers, and it is no exception to this reality. In fact, market gardening has developed production systems based on the use of chemicals, so that it currently appears to be very dependent on chemical pesticides. During 2016, 21,997 tonnes of pesticides were imported into Côte d'Ivoire. The redistribution of these phytosanitary products by agricultural sector shows that market gardening mobilizes 80% of insecticides, 50% of fungicides and 25% of herbicides (Traoré *et al.*, 2017). The use of pesticides for pest control has become systematic in market gardening in order to optimize yields (Cissé *et al.*, 2003; Doumbia *et al.*, 2009; James *et al.*, 2010).

In Côte d'Ivoire, market gardening is developing on the outskirts of towns. Market gardening spreads everywhere but mainly in the Center, North, East and South on the outskirts of Abidjan. According to report statistics (De Bon *et al.*, 2019), national vegetable production was estimated at 637,000 tonnes in 2016. In addition, market gardening constitutes a source of livelihood, employment and income for many vulnerable populations (Fondio *et al.*, 2010).

In the North of Côte d'Ivoire, market gardening is mainly practiced by women (Sangaré *et al.*, 2020). However, market gardening suffers from many constraints which limit its development. These are mainly linked to climate change,

access to equipment, quality inputs (fertilizers and organic matter, seeds and pesticides). To improve market gardening production, the Ivorian state has initiated a number of actions. Thus, the support Project for small Market Gardeners in the Savannah zone (PMGS) and the Support Project for the Development of the Cassava and Market Garden Sectors in Côte d'Ivoire (PRO2M), etc. were financed by development partners (International Fund for Agricultural Development). The objective of these projects was to provide producers with agricultural equipment, improved seeds andquality fertilizers. In addition, the supervisory structures, in particular the National Rural Development Agency (NRDA) trained and sensitized market gardeners to the rational use of phytosanitary products, chemical fertilizers dedicated to market gardeners, to the manufacture of manure organic. Despite these initiatives, the exploratory survey carried out among market gardeners in Nambedeleka reveals that they use chemical inputs on a massive scale. Moreover, this massive use constitutes a risk for the health of consumers and handlers of chemical pesticides. The objective of this study is to examine the health effects of chemicals on the health of producers and consumers.

STUDY METHODOLOGY

Study Sites and Target Populations

The study was carried out in the village of Nambedeleka, located 4 kilometers from the town of Korhogo. The choice of this village is justified by the fact that market gardening is practiced mainly by women. These are also organized in a market gardening group called "CHIGATA". They sell their harvested vegetables on the large market in Korhogo. The members benefit from the technical support of the Bureau de formation et de Conseil au Développement (*BFCD*). Thus, the target population is made up of market gardeners, officials of the CHIGATA group, agricultural supervisors and health workers.

Sampling

Simple random sampling techniques and reasoned choice made it possible to draw up the sample of market gardeners, managers of the “ CHIGATA ” group, agricultural supervisors and health workers. The use of simple random sampling consisted of choosing members of the grouping in such a way as to offer them equal chance of being included in the sample. This technique made it possible to accidentally question the producers present on their market garden plots. Out of a staff of 73, we randomly selected 27 producers, or approximately 36.98%.

Regarding the qualitative data, we used reasoned choice sampling to constitute the sample of CHIGATA managers and agricultural supervisors according to the following inclusion criteria : being responsible for CHIGATA, being an agricultural supervisor working in the village , be a health worker.

In short, the distribution of the sample is made as follows :

Table 1: Sample Distribution

Social Category	Number of Respondents
Producers	27
Responsible	3
Agricultural supervisors	3
Health workers	2
Total	**35**

Source: Field Survey, 2021

In total, the sample is made up of 35 respondents, including 27 producers-members of CHIGATA, 3 managers of CHIGATA, 3 agricultural supervisors and 2 health workers.

Collection of Data

This research is part of a mixed approach (qualitative and quantitative). Thus, the guided interview was used as a method of collecting quantitative data. This interview was carried out using a questionnaire which made it possible to collect data from the producers of market garden products. Regarding the qualitative approach, the data was collected using a semi-structured interview. In this context, the individual interview guide was administered to the managers of CHIGATA, to agricultural supervisors working in the village and to health workers. These qualitative data were however collected within the saturation limit.

Secondary data was collected from the literature. It is therefore data from other sources than the field survey. They come from journals, archives, memoirs consulted in libraries or the Internet, etc.

Data were collected from 1 st to 3 October 2021. They were held at headquarters and garden Chigata.

Data Processing

Qualitative data was recorded using a typist during the survey and transcribed using the Google docs voice tool. Thus, we were able to identify units of meaning around the data collected. We carried out a thematic analysis which consisted in dividing the verbatims into several units with each of the appropriate themes.

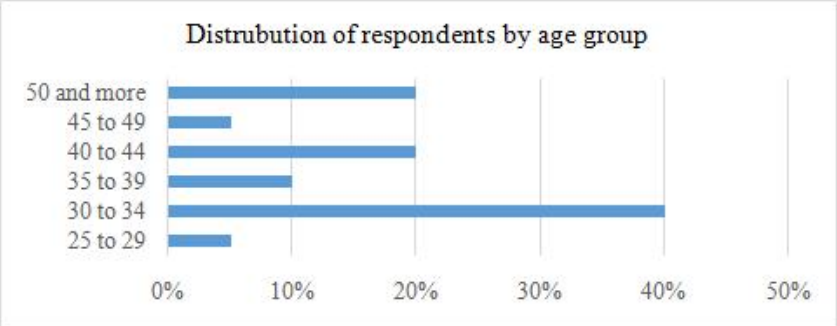
In addition, the questionnaires obtained during the survey were completed in software. Before hand, an input mask has been developed, then filled in. From this database, we

RESULTS

Socio-Demographic Profile of Women Producers

The socio-demographic characteristics taken into account in this survey were the age, marital status and educational level of the women. The results obtained for these different parameters are presented below:

Age of Women Market Gardeners



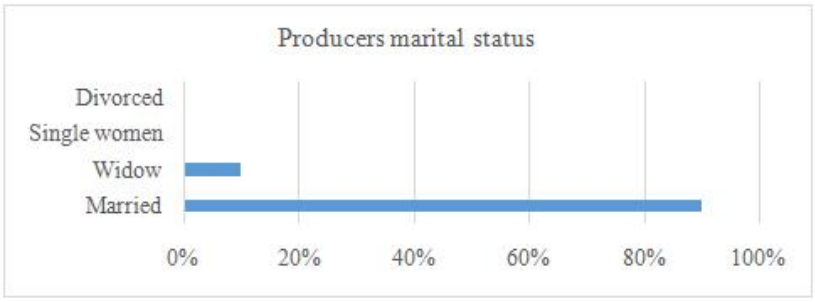
Source: Our Field Surveys, October 2021

Graph 1: Distribution of Women Producers by Age Group.

Most of the producers are between 30 and 34 years old. The 40 to 44 age group and the 50 age group follow. Analysis of this graph indicates that market gardening is practiced by women, whether young or old. This situation results from the fact that in Senufo country, the vegetable garden has always been considered as an activity mainly for women to

ensure the consumption of the family. Thus, market gardening for women contributes to domestic food and the surplus is marketed with a view to making a profit.

Marital Status of Producers

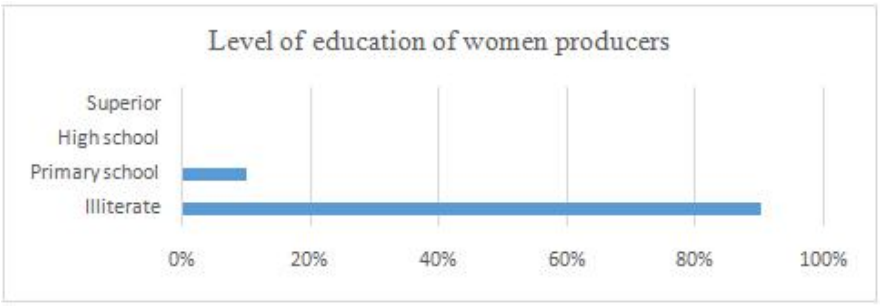


Source: Our Field Surveys, October 2021

Graph 2: Distribution of Women Producers According to Marital Status.

Graph 2 reveals that the majority of producers (90%) are married according to custom. There are, however, a few widows (10%). The marital status of women has an influence on access to phytosanitary products.

Educational Level of Women Producers

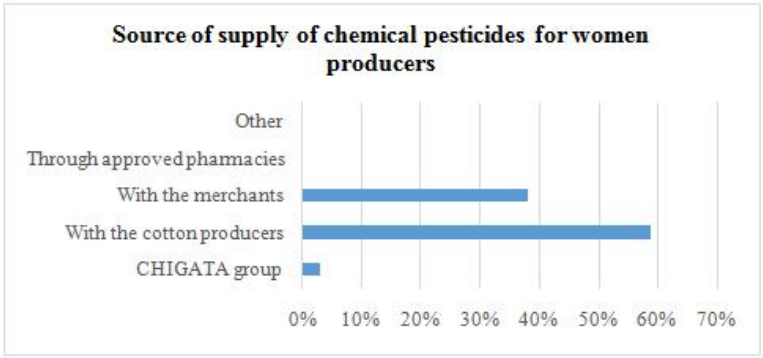


Source: Our Field Surveys, October 2021

Graph 3: Distribution of Women Producers According to the Level of Education.

The interpretation of this graph 3 shows that the majority of women producers are illiterate (90%). However, we can see from this same graph that 10% of women have primary education. This low level of education is a factor limiting the risks associated with the massive use of chemical pesticides.

Sources of Supply of Chemical Pesticides to Producers



Source: Our Field Surveys, October 2021

Graph 4: Sources of Supply for Producers.

On observation, graph 4 indicates that the majority of producers (59%) obtain supplies of chemical pesticides from cotton producers. 38% of respondents get their supplies from traders. Thus, women producers have easy access to chemical pesticides dedicated to cotton cultivation, as confirmed by the following comments :

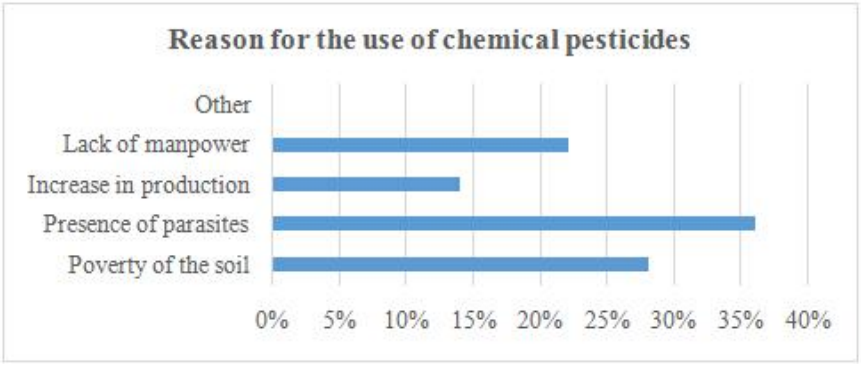
> *"We take chemicals with our husbands who grow cotton. Those, whose husbands do not make cotton, will buy the products from cotton producers or from vendors in the village, in Korhogo ".*

This extract shows that women producers get their supplies from their cotton-producing husbands who receive chemical inputs on credit from the cotton company. Thus, the producer can use her husband's stock of chemicals. She can also get supplies in the village cheaply from cotton farmers who need money to meet their urgent needs. This fact is illustrated by the words of an agricultural advisor :

> *"The cash-strapped producer sells a box of insecticide for 500 FCFA to a market gardener producer. The woman can also buy a box with the son of a cotton farmer who needs money to buy cigarettes ".*

Social proximity to cotton producers facilitates women's access to chemical pesticides intended for cotton cultivation. Producers of market garden products fall back on these pesticides in view of their affordable cost, with the consequences that this could have for human health. In addition, the interlocutors revealed that the absence of distribution structures for chemical pesticides dedicated to market gardening legitimizes the use of cotton phytosanitary products. Under these conditions, access to market garden pesticides therefore remains difficult, especially in terms of proximity, because the producer has to travel to get supplies.

Reasons for using Chemical Inputs on Market Gardening



Source: Our Field Surveys, October 2021

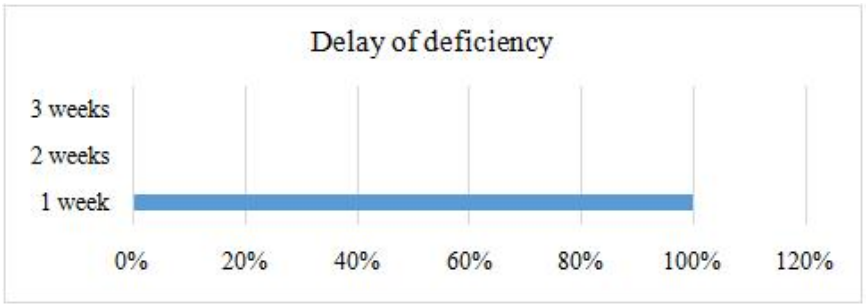
Graph 5: Distribution of Respondents According to the Response Methods.

According to our surveys, several reasons are mainly mentioned by the producers. But, three mainly caught our attention. These are among others : the presence of parasites in the gardens, the poverty of the soil and the lack of labor. This is what emerges from the following comments : *" There are a lot of caterpillars in the soil which spoil the plants, that's why we use chemicals such as EMA-STAR 336EC to kill them "* argued a *farmer interviewed ".* Another added : *" The earth has become poor ; so if you don't use chemical fertilizers, you won't have a good harvest ".*

Cabbage, tomato, okra, onion and eggplant are very sensitive to attacks from pests whose action can cause significant yield losses. Producers of market garden products then use pesticides to enrich the soil and fight against insects and parasites that attack plants. For example, the product " EMA-START " effectively fights caterpillars through its active ingredient EMAMECTINE. They also use chemical pesticides because they do not have manpower for weed

control. According to the interlocutors, the use of chemical pesticides, mainly herbicides, reduces the expenditure of wage labor for the weeding of these weeds.

Phytosanitary Treatments for Plants Growing Closer and Closer



Source: Our Field Surveys, October 2021

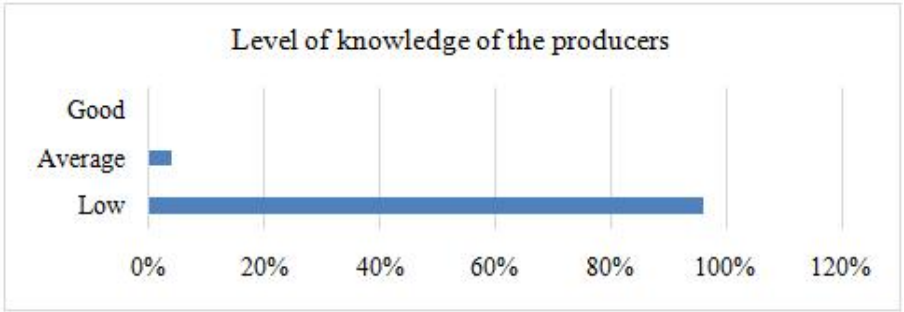
Graph 6: Distribution of Market Gardeners According to the Processing Time Observed.

Almost the majority of market gardeners observe a processing time of less than one (1) week. The words of this interviewed producer describe this fact: *"We do the insect treatment every week. Even at harvest time, we process. But, we wait 7 days to harvest ".*

This cultivation practice, in particular the phytosanitary treatment during the production period, is not recommended by the supervisory staff as illustrated by the following comments : *" During the production phase, the plants should no longer be treated with phytosanitary products ".*

Ultimately, the producers of market garden products do not respect good cultural practices in terms of phytosanitary treatment.

Health Risks Linked to the Low Level of Knowledge of Women Producers



Source: Our Field Surveys, October 2021

Graph 7: Knowledge Level of Producers.

This graph shows that almost all of the producers (96%) have a low level of knowledge of the risks that chemical pesticides represent for the health of consumers. The interviews support this low level of knowledge. This is what an agricultural advisor points out :

> *" Women are not aware of the effects of phytosanitary products, particularly the insecticides intended for the cotton plant that they use. All that matters to them is to eliminate the caterpillars, to protect the plants. They do not know the side effects on the people who will eat these market garden products treated with these cotton pesticides ".*

The low level of knowledge of the producers is explained by the fact that almost all of them (90%) are illiterate. Therefore, she cannot read the label and the leaflet to know that pesticides dedicated to cotton cultivation are prohibited on vegetable crops.

In short, the ignorance of the dangers and the illiteracy of the majority of producers of market garden products can have harmful consequences for man.

Effects of All-Round Pesticides on the Health of Producers and Consumers

The massive use of chemical pesticides in general and that of cotton cultivation on market garden products in particular (eggplant, onion, cucumbers, okra, etc.) constitute a health risk for the handlers of these products which do not carry any damage. " protective equipment (glasses, mask, gang, etc.) during treatment. This state of affairs is decried by an endogenous adviser in these terms : *" Women do not wear protective equipment when spraying their plots with insecticides ."*

Thus, the survey data reveals that producers are exposed to certain ailments such as headaches and itchy eyes. They do not manage to establish the link of these discomforts with the activity of the spreading of phytosanitary products. This situation is illustrated by the words of one of them : *"The day we treated the plants with the products, we noticed that we were tired ; we have headaches. And our eyes are scratching. But, we don't know what is causing this ".*

Likewise, interviews with health workers reveal cases of hospitalization of plant protection product handlers. The fact emerges in the words of a doctor from the emergency department of the Korhogo regional hospital who said this : *" Plant protection product handlers were admitted to the Korhogo hospital. They had heart and kidney complications ".*

The permanent contact of unprotected manipulators then explains the cardiac and renal complications. In addition, the use of chemical pesticides on market garden products represents a risk to the health of consumers who are not informed about the dangers of such cultural practices. In this sense, an agricultural adviser states :

> *" The phyto cotton products that women use to treat market garden plants are dangerous for health. These products are only intended for cotton. In the long run, that will create illnesses for those who consume these market garden products ".*

It is clear from these comments that the use of non-recommended cotton chemical pesticides for vegetable crops is a source of disease. Indeed, chemical pesticides in cotton are very toxic. The toxicity strip indicates that these pesticides are harmful, dangerous, very dangerous. Also the cross of Saint Andrew and the skull indicate their dangerousness. Thus, the consumption of market garden products immediately after their treatment can constitute a risk to the health of consumers. This is confirmed by a doctor from the Korhogo regional hospital in these terms :

> *" The consumption of market garden products treated with phytosanitary products can lead to risks in the long term. These products can have harmful effects on vital organs if their concentration is high in the body. For example, they can cause lesions in the digestive system, heart, kidneys. Cases of intentional and accidental poisoning were also interned at the regional hospital ".*

In view of these comments, phytosanitary products have harmful effects on vital organs (kidneys, heart, liver, etc.). They are therefore factors of disease among producers and consumers of treated vegetables. On the one hand, by handling, spraying or breathing that producers are particularly exposed to phytosanitary products. On the other hand, it is by eating processed foods that consumers find themselves exposed to phytosanitary products.

DISCUSSION

The market gardening activity in Nambedeleka mobilizes a population of women as young as they are old. This situation corroborates those of other authors (Cissé *et al.* , 2003 ; Ouedraogo, 2012 ; Mondedji *et al* ., 2015) who have demonstrated the presence of young, adult and elderly women in market gardening. In addition, the majority of women producers are married. Matrimonial union is indeed a sacred social act in Senufo country (Yebé, 1992). This status promotes easy access for women market gardeners to chemical pesticides dedicated to cotton cultivation, given that their husbands are cotton farmers. The level of education of women market gardeners is low because the majority of them are illiterate. This situation corroborates that described by Ohui (2014) who indicated that the majority of market gardeners surveyed in the commune of Koubri have no level of education, which implies that they are not able to read the application methods. pesticides they use.

In addition, survey data shows that market gardeners obtain chemical pesticides from cotton producers. The supply chain from producer to producer, especially with regard to pesticides reserved for cotton and used in vegetable production has also been observed in Burkina Faso (IFDC, 2007; Toé, 2010; Ouédraogo et *al.* , 2011). Our results are different from those of Ohui (*LC*) which reveal that market gardeners get their supplies from pesticide resellers in the commune of Koubri who do not have a seller's license as provided for by the law on pesticides in Burkina Faso. . In addition, market gardeners fall back on chemical pesticides from cotton because of their easy access to producers in the village, their affordable cost and the lack of distribution structures for local market gardeners. The factors which lead to the excessive use of pesticides in vegetable production in Nambedeleka are : the presence of parasites in the gardens, the poor soil and the lack of labor. The investigation notes, however, that the producers harvest the vegetables one week after the phytosanitary treatment. A different result was found in Togo where the majority of market gardeners observe a waiting period of between 7 and 21 days (Kanda *et al.* , 2013).

Producers of market garden products use phytosanitary products without any protective equipment (Doumbia *et al.*, 2009, Mawussi *et al.*, 2014) However, these products are toxic. Women producers are therefore frequently confronted with health problems. the same observation was made by Soro *et al.* , (2019) who have shown that horticulturalists have headaches and sneezes, dizziness, dermatitis, and vomiting after treatment. Cases of hospitalization of plant protection product handlers due to poisoning during the spreading of plant protection products have been described in market garden produce producers in Korhogo (Gacha *et al.*, 2018). In addition, the high use of pesticides approved for cotton but not authorized on market garden crops (Son, 2018 ; De Bon et *al.* , 2019) can lead to health risks for consumers. However, market gardeners do not recognize these risks because most of them are illiterate. This low level of education of market gardeners does not militate in favor of a rational use of pesticides by limiting their ability to read, understand and apply manufacturers' instructions but also to understand health issues (Diop, 2013). Illiteracy represents a real risk because of the ignorance by the producers of the rules of good use of plant protection products (De Bon *et al.* , *LC*) Thus, the use of cotton insecticides, particularly Ema Star 336EC, Typhoon 96SC, etc. on the market gardening poses major risks to the health of consumers. Indeed, the continued consumption of fruits with high concentrations of pesticide residues can have

adverse effects on human health (Son, 2018). Similar results have been reported by Pesticide Action Network (2005) which underline that pesticides used in developing countries in excessive or unsuitable quantities thus inevitably leave residues on vegetables ; which could harm human health.

CONCLUSION

This study examined the effects of chemical pesticides on the health of producers and consumers. The study highlights the socio-demographic profile of market gardeners, particularly age, marital status and level of education. The survey reveals that market gardening is practiced by young and adult women. They are predominantly married and illiterate. Thus, women market gardeners obtain their supplies of chemical pesticides from their cotton-producing husbands. They then use chemical pesticides from the cotton plant on market garden produce. In addition, their low level of education means that they are ignorant of the dangers associated with pesticides. Indeed, the consumption of market garden products treated with cotton pesticides can cause serious health problems in the long term. For this reason, it is essential to educate women, train women market gardeners and set up a supply circuit for chemical pesticides dedicated to market gardening.

BIBLIOGRAPHICAL REFERENCES

1. *Adechian S. A., Baco M. N., Akponikpe I., Toko I. I., Egah J. et Affoukou K., 2015. Les pratiques paysannes de gestion des pesticides sur le maïs et le coton dans le bassin cotonnier du Bénin. La Revue Electronique en Sciences de l'Environnement, Volume 15 Numéro 2 | Septembre 2015 ; https://doi.org/10.4000/vertigo.16534)*
2. *Cissé I, Tandia A. A., Fall S.T. et Diop E. H.S. 2003. Usage incontrôlé des pesticides en agriculture périurbaine: cas zone des Niayes au Sénégal. Cah. Etud. Rec. Francoph. Agric., 12, 181-186.*
3. *De Bon H., Fondio L., Dugué P., Coulibali Z. et Biard Y., 2019, Étude d'identification et analyse des contraintes à la production maraîchère selon les grandes zones agro-climatiques de la Côte d'Ivoire ; FIRCA et PRO2M*
4. *Diop A.. 2013. Diagnostic des pratiques d'utilisation et quantification des pesticides dans la zone des Niayes de Dakar (Sénégal). Autre. Université du Littoral Côte d'Opale, 2013. https://tel.archives-ouvertes.fr/tel-00959895*
5. *Doumbia M. et Kwadjo K.E. 2009. Pratiques d'utilisation et de gestion des pesticides par les maraîchers en Côte d'Ivoire : cas de la ville d'Abidjan et deux de ses banlieues (Dabou et Anyama). J. Appl. Biosci., 18, 992 – 1002.*
6. *Fondio L., Djidji A. H., Deza A. M., N'gbesso M., Assouma Y., Mahyao A., N'zi J. C. et Tahouo O., 2010. Le maraîchage urbain et périurbain en Côte d'Ivoire, un secteur qui génère des emplois et des revenus. Le CNRA*
7. *Gacha F., Affessi A. S. et Assi T. M., 2018. Culture intensive de proximité et dommages environnementaux dans la ville de Korhogo au nord de la Côte d'Ivoire, Revue DEZAN, numéro 14*
8. *IFDC, 2007. Problématique de l'utilisation des produits phytosanitaires en conservation des denrées alimentaires et en maraîchage urbain et péri urbain au Burkina Faso : cas de Bobo Dioulasso, Ouahigouya et Ouagadougou*
9. *James B., Atcha-Ahowé C., Godonou I., Baimey H., Goergen G., Sikirou R. et Toko M. 2010. Gestion intégrée des nuisibles en production maraîchère : guide pour les agents de vulgarisation en Afrique de l'ouest. Institut international d'agriculture tropicale (IITA), Ibadan, Nigeria. 120 p.*
10. *Mawussi G, Kolani L, Devault D.A, Alate K.K.A, Sanda K. 2014. Utilisation de pesticides chimiques dans les systèmes de production maraichère en Afrique de l'Ouest et conséquences sur les sols et la ressource en eau : le cas du Togo.*

11. *Mondedji A. D., Nyamador W. S., Amevoin K., Adéoti R., Abbévi Abbey G., Koffivi Ketoh G. et Glitho I. A., 2015. Analyse de quelques aspects du système de production légumière et perception des producteurs de l'utilisation d'extraits botaniques dans la gestion des insectes ravageurs des cultures maraîchères au Sud du Togo ; International Journal of Biological and Chemical Sciences, 9(1): 98-107 ; DOI : http://dx.doi.org/10.4314/ijbcs.v9i1.10 , consulté le 22/11/2021*
12. *Ohui D. H., 2014. Risques environnementaux et sanitaires associes a l'utilisation des pesticides autour des petites retenues : cas du bassin versant de Nariarle ; Mémoire de Master en Ingénierie de l'Eau et Assainissement; Institut International d'Ingénierie – Ouagadougou- BURKINA FASO ; 2ie@2ie-edu.org - www.2ie-edu.org; consulté le 27/11/2021*
13. *Ouedraogo D., 2012. La vie des femmes productrices d'oignon dans l'Oudalan au Burkina Faso : Comment mesurer l'impact ? Mémoire de Master, Université de Ouagadougou*
14. *Ouédraogo M., Toé A.M. Ouédraogo T.Z., Guissou P.I., 2011. Pesticides in Burkina Faso : Overview of the Situation in a Sahelian African Country. Pestic. Mod. World - Pestic. Use Manag. 35–48.*
15. *Pesticide Action Network, 2005, Étude d'impact socio-économique, sanitaire et environnemental de l'utilisation des POPs à Davié au Nord de Lomé (région Maritime), Togo, Rapport d'étude, Lomé, IPEP, PAN Togo, 37 p.*
16. *Sangaré M., Kam O. et N'Dri K. A., 2020. Contraintes socioéconomiques du passage des groupements maraîchers a la société coopérative dans la sous-préfecture de Korhogo ; International Journal of Humanities and Social Science Vol. 10 • No. 6*
17. *Son D., 2018. Analyse des risques liés à l'emploi des pesticides et mesure de la performance de la lutte intégrée en culture de tomate au Burkina Faso (Thèse de doctorat). Université de Liège, Gembloux Agro-Bio Tech, Belgique.*
18. *Soro G., Wahabi S. A., Adjiri O. A. ET Soro N., 2019. Risques sanitaires et environnementaux liés à l'usage des produits phytosanitaires dans l'horticulture à Azaguié (Sud Côte d'Ivoire), Journal of Applied Biosciences 38: 14072 - 14081, www.m.elewa.org/journals, consulté le 03/12/2021*
19. *Toé A.M., 2010. Étude pilote des intoxications dues aux pesticides agricoles au Burkina Faso, Convention de Rotterdam, 55 p.*
20. *Traoré A. et Haggblade S., 2017 Rapport Final de mise en œuvre des politiques régionales sur les pesticides en Afrique de l'ouest : étude de Cas en Côte d'Ivoire, FSP research paper 67-fr.pdf.*
21. *Yebé K., 1992. Les implications socio-culturelles de l'intégration de la femme ivoirienne dans la problématique du développement rural (Le cas de la Femme senoufo de· Korhogo) ; Mémoire de DEA, Département de Sociologie, Université d'Abidjan*